

1 **Anxiety during Transition from Primary to Secondary Schools in Children with**
2 **Neurodevelopmental Disorders: A Cross-syndrome Comparison**

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21 **Abstract**

22 **Background:** The current paper examined the impact of the transition from primary to
23 secondary school on anxiety for children with Neurodevelopmental Disorders (NDDs), specifically for
24 autistic children, children with Down Syndrome (DS) and Williams Syndrome (WS). Previous research
25 has highlighted the impact such educational changes can have upon autistic children, but there is only
26 limited research for children with DS and none for those with WS. Hence, this study aimed to better
27 understand whether school transitions have a unique or similar impact on anxiety through a cross-
28 syndrome comparison.

29 **Methods:** Sixty-one parents as well as their autistic children, children with DS and WS
30 completed an online survey at two time-points, which included questions on adjustment and
31 psychopathology, maladaptive behaviours, and other open-ended measures about their child's skills as
32 well as their experiences of the transition from primary to secondary school. Children themselves
33 completed a short interview as well as a set of cognitive abilities tasks.

34 **Results:** Both children and parents of all three groups expressed concerns about bullying and
35 adjustment to new environments during transition from primary to secondary school. Although wide
36 variability was found within the autism, DS and WS groups, no significant differences were revealed in
37 overall levels of parent-reported anxiety before and after the transition for any of the groups. However,
38 different factors, including maladaptive behaviour, social problems and peer problems predicted anxiety
39 during pre- and post-school transition for the three groups.

40 **Conclusions:** This first cross-syndrome comparison on the effect of transition from primary to
41 secondary school on anxiety highlighted the importance of individual variability when examining the
42 transition outcomes of children with NDDs. Additionally, it identified clusters of overlap in terms of
43 parent-report and child-report experiences of transition and unique predictors that need to be considered

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44 when planning transition support for autistic children, children with DS and WS. Future research should
45 investigate the role of protective factors both at an individual and school level to inform the development
46 of evidence-based intervention that support successful transition to secondary education.

47 **Keywords:** *School transition, Education, Neurodevelopmental disorders, Anxiety*

48

49 **Background**

50 The transition from primary to secondary school is a key milestone in a young person's
51 educational trajectory (1). This transition can provide opportunities for children to flourish and develop
52 as an individual (2), but can also be a stressful and challenging period due to several changes, such as
53 moving to larger classrooms, interacting with more teachers, or navigating bigger spaces to name a few
54 (3). Clinicians, educators, and researchers are aware of the social, intellectual, organisational, and
55 emotional challenges associated with the transition from primary to secondary school and the impact
56 they have upon children's psychosocial wellbeing (4,5), as well as on parents and teachers (6). There
57 is, however, an urgent need to further our understanding on the impact of transition from primary to
58 secondary placements for children with Neurodevelopmental Disorders (NDDs).

59 A growing body of research has documented the vulnerability of children with NDDs and their
60 heightened risk to experience worries and fears during the transition from primary to secondary school,
61 which consequently induce anxiety and stress (5,7,8). Factors that contribute to this vulnerability are
62 often associated with physical, pedagogical, and social changes as well as interpersonal factors such as
63 social understanding and sense of belongingness, which also vary from case to case (9,10).

64 Physical changes in the environment can be emotionally demanding for a child. During the
65 transition from primary to secondary school, children often move to larger spaces with more than one
66 building or classrooms (11). It has often been reported that these physical changes increase the chances
67 of distress to children as they risk getting lost while wandering around (12–14) and that can increase
68 anxiety (15). Pedagogical changes, such as being taught by several teachers with a variety of teaching
69 styles for different subjects as opposed to one teacher for all subjects, increased homework, and
70 expectations of independency can be turbulent to children's adjustment to the new environment and
71 affect children's participation in the classroom(3,11). Finally, social changes create a lot of anxiety

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72 during school transitions. Peer relationships change during the primary to secondary school transition
73 (16), causing fears about losing old friends and anxiety related to the new friendships being formed, as
74 well as a fear about the possibility of being bullied by new or older peers (13,17,18). Based on previous
75 research, students with NDDs are more likely to be bullied compared to typically developing students
76 (19–21) which subsequently can have a profound impact on their mental health (22).

77 Research has shown that autistic children are at a greater risk of experiencing a negative
78 transition from primary to secondary school (23). Autism refers to the neurodevelopmental disorder
79 that is usually associated with differences in social communication and interaction and sensory
80 processing, and patterns of repetitive behaviours from early on in development (24). It is estimated that
81 700,000 people in the UK have a diagnosis of autism, and there is at least one autistic child in every
82 classroom (25). Autistic children are more likely to experience elevated levels of mental health
83 compared to other children with NDDs (26,27) including clinically significant anxiety (28). More
84 specifically, autistic children can experience social anxiety related to differences in social
85 communication and interaction and can find it increasingly difficult to navigate the wider socialisation
86 demands of adolescence (29,30), leading to loneliness and difficulty in building peer networks (31).
87 Indeed, researchers highlighted that autistic children exhibited high levels of mental health issues and
88 anxiety pre- and post-school transition, specifically from primary to secondary school (32). Other
89 literature has also shown that autistic children can face major difficulties adjusting to and coping in their
90 new secondary placements (1,33,34), experience increased anxiety and social pressure (35) and can find
91 it difficult to adjust to the unfamiliar, and therefore unpredictable environment of secondary school
92 (35,36).

93 Children with Down Syndrome (DS) or William Syndrome (WS) show uneven cognitive and
94 behavioural profiles that may also put them at a higher risk for negative school transition experiences.

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95 Down syndrome is a genetic chromosomal disorder occurring in about 1 in 800 live births and resulting
96 in lifelong intellectual disability and other developmental delays (37–39). Currently, there are
97 approximately 41,700 people with DS in England and Wales as of 2018 (40). Researchers report that
98 children with DS often have delays in cognitive development with overall IQ scores in the moderate
99 (35-50) to severe (20-35) range in terms of intellectual disability. Individuals with DS show delays in
100 language production and expressive speech development (41,42) as well as poor short-term memory
101 (43). Many children with DS are sociable and engage in social activities and make friends (44), which
102 also increases the chances of getting bullied in attempts to socialise in new environments due to their
103 social vulnerability (45). Few studies have investigated anxiety in children with DS, and the findings of
104 the limited literature are conflicting; while one study suggested children with DS score significantly
105 lower on anxiety compared to normative samples(46), another study reported that patterns of anxiety in
106 children with DS follow those of typically developing children (47), and one study found children with
107 DS often show higher anxiety for issues around fear of strangers (47).

108 Little is also known about the experiences of children with DS during transition from primary to
109 secondary placements, including their anxiety relating to this transition. In a few attempts to unpick the
110 topic, researchers found some common and reoccurring aspects. For example, whilst children with DS
111 are more likely to be educated in a mainstream school in the UK and internationally compared to children
112 with other NDDs (48,49), many pupils with DS (63%) move from primary mainstream to special
113 secondary schools (49). Whilst there is great support, the experiences of children with DS are variable
114 regardless of the strategies to provide best practice in education (50). Yet, research has touched on the
115 benefits to children with DS when parents and school-staff plan together the school-transition, e.g.,
116 family and societal benefits such as recognition of the capabilities of people with disabilities and
117 communication with other families of children with disabilities (51,52). Still, there has not been any

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118 research that has examined anxiety levels of children with DS during transition from primary to
119 secondary school.

120 Similarly, there is currently no research that has examined the impact of transitions from primary
121 to secondary school for children with Williams Syndrome (WS). WS is a rare genetic condition occurs
122 randomly and affects around 1 in 18,000 people in the UK (53). It is associated with physical health
123 problems (54) and similarly to DS, IQ scores range from moderate (40) to severe intellectual difficulties
124 (20). Children with WS have delayed and atypical language development, difficulties with spatial
125 cognition, and number development (55). Children with WS are sociable and friendly, even hyper
126 sociable, and have little fear of strangers (56). Despite this overly outgoing social nature, children with
127 WS struggle to obtain meaningful friendships with peers (57). In addition, they show higher levels of
128 clinical anxiety, including general anxiety, separation anxiety and fear of injury with anxiety increasing
129 as children get older (58–60). Despite the lack of research on school transitions in WS, a recent parental
130 survey has shown that pupils with WS are likely to transition from mainstream primary schools to special
131 needs provisions when they move to secondary schools (61). However, no studies have examined the
132 transition from primary to secondary school process or impact of that process on anxiety in pupils with
133 WS directly (62). As children with WS often experience high anxiety in general and they prefer
134 structured routines (59,62), it can be predicted that they are likely to be impacted by transition from
135 primary to secondary school and experience elevated levels of anxiety.

136 Researchers also demonstrated in a systemic review how transition from primary to secondary
137 school not only affects autistic children per se, but the parents and teachers too (63). Parents often worry
138 for their child's wellbeing and adjustment, and they feel alienated in school discussions (64). For
139 example, parents often are not aware of changes that occur in their child's school life and hence cannot
140 provide full support and be understanding towards their child. As for the teachers, there seems to be a

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141 struggle on how to provide the best support to autistic children during the school transition due to the
142 inadequate resources and training available as to how to navigate this milestone in the
143 neurodevelopmental population (64).

144 Altogether, previous research shows that transition from primary to secondary school can be
145 challenging for children with NDDs, and it can increase anxiety levels (11–13,15). However, it is still
146 unclear whether the transition experiences of children with different NDDs are unique or whether
147 different groups of children experience similar school transitions. For example, all individuals with
148 general high anxiety are equally affected and some individuals with NDDs, like those with DS, would
149 experience less anxiety during transitions compared to those with autism (65).

150 There is a plethora of factors that need to be considered from individual-, school- to systemic-
151 level factors when unpicking phenomena such as school transitions. Nonetheless, the temporal existence
152 of those problems has been discussed in the literature and typically developing children show that
153 distress and negative emotions go away as they adjust to their new school environment (1). Similarly,
154 other researchers also reported no escalation of difficulties during the transition for autistic children
155 (32), but it is important to consider the methodological issues around the small sample used in their
156 study and the lack of control group. Further to this, it is unclear whether autistic children are the only
157 ones that experience stressful school transitions or whether children with other NDDs are also at an
158 increased risk of experiencing difficulties during school transition and to what extent the impact is
159 comparable across different groups of NDDs.

160 The current study involved a cross-syndrome comparison of the three NDDs groups, Autism,
161 DS and WS, to examine the similarities and differences in anxiety pre- and post-school transition and
162 the variability within each NDD group, specifically from primary to secondary placement. Such a
163 comparison aimed to elucidate how experiences and difficulties compare between and within NDDs,

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164 and consequently highlight how to support children with different NDDs and their families during school
165 transitions (61). The current study included views from both children and parents across the transition
166 process to build a more holistic understanding of anxiety during transition from primary to secondary
167 schools for autistic children, and children with WS and DS. This study addressed the following research
168 questions:

- 169 1. What do parents and children report about the outcomes of the transition from primary to
170 secondary school process, in terms of bullying, belonging and being settled?
- 171 2. What is the impact of school transition on anxiety scores and how different is this effect across
172 the different groups?
- 173 3. How do factors such as cognitive abilities, social impairment, adjustment, and psychopathology
174 as well as maladaptive behaviour compare across the three NDD groups and then how these
175 factors can predict anxiety during pre- and post-school transition?

176 Based on previous literature and our clinical experience, it was predicted that transition periods are
177 a challenging time for children and thus, parents would report higher levels of concerns and worries
178 about their child's psychosocial wellbeing, especially around bullying and being settled in the school
179 (63). In terms of the children reports, since there is not much research that investigates DS and WS
180 children's concerns, we expected autistic children to report higher frequency of bullying and lower
181 scores for being settled. For the second research question, it was predicted that autistic children and
182 children with WS would experience higher levels of anxiety pre- and post-school transition (1,32,66)
183 (1,32) when compared to children with DS (47). Finally, for the third research question, we expected to
184 see psychopathology and maladaptation to act as two significant predictive factors for all group
185 considering that research shows that there are some parallels between autism, DS and WS in these
186 aspects (26,27). Due to the limited research in the field of transitions and anxiety, no other projections

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187 were made considering the factors that could predict anxiety for DS and WS.

188

189 **Methods**

190 The present study employed standardised questionnaires and cognitive battery tests to assess the
191 impact of school transition across different groups of individuals with NDDs. Additional surveys with
192 parents and interviews with children were used to assess the concerns and the transition experiences.
193 This study focuses on the quantitative outcomes.

194

195 **Participants**

196 Participants were children living in the UK with a formal diagnosis of either autism, DS or WS,
197 who were set to experience a transition to a different school environment (i.e., a transition to a different
198 school or a transition to a different school-site or new building), and one parent per child participant.
199 The final participant sample for this study included child-parent dyads who completed all the measures
200 pre- and post- transition. Families were recruited nationally through advertising across various forums:
201 special needs support groups, charity foundations including the Williams Syndrome Foundation UK and
202 Downs Syndrome Association, social media campaigns, and approaching schools directly. Thus,
203 families could have accessed the survey through several routes. An overview of the participants can be
204 found in Tables 1-2.

205

206 [<<Table 1>>](#)

207 [<<Table 2>>](#)

208

209 **Procedure & Materials**

210 Parents completed a survey hosted in Qualtrics. Children engaged in an online interaction with
211 the researcher via the video conferencing software (Zoom) to (a) complete the related cognitive
212 assessments, and (b) answer the standardised survey questions which were read out by the researcher
213 (with the assistance of visual aids). Parents and children completed their respective measures at two
214 time-points, pre- and post-school transition. Specifically, data was collected when the children were
215 attending the last year of their primary school in the UK (Time 1) and then again during the first year of
216 secondary school (Time 2). Data was collected from 2018 up to December 2019 and thus was not
217 impacted by the COVID-19 pandemic.

218

219 **Measures**

220 *Cognitive Abilities*

221 To assess overall cognitive abilities, the British Picture Vocabulary Scale (BPVS: (67)) as well
222 as the Ravens Coloured Progressive Matrices (RCPM; (68)) were administered to the children.

223 BPVS is a standardised assessment that assesses vocabulary comprehension abilities. Children
224 are shown four-line drawings and asked to choose the one that best fits the spoken word they hear. Raw
225 scores were reported as they are more sensitive to short time changes.

226 RCPM is a measure of non-verbal intelligence based on visual patterns and inference making
227 skills. This is a multiple-choice task of 36 items where the child selects which pattern out of 6 pieces
228 best completes the overall matrix displayed. Raw scores were reported.

229

230 *Social Responsiveness Scale – Second Edition (SRS-2)*

231 The SRS-2 (69) was used to assess children’s sociability. Parents rated their child on 65 items

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232 of social abilities (e.g., seems much more fidgety in social situations than when alone) using a 4-point
233 scale from ‘not true’ to ‘almost always true’. The SRS-2 was completed at Time 1 only. Higher scores
234 indicated worse social skills.

235

236 *Strengths and Difficulties Questionnaire (SDQ)*

237 The SDQ (70) was used to assess children’s adjustment and psychopathology attributes,
238 including five sub-scales: emotional symptoms, conduct problems, hyperactivity, peer relationships
239 problems and prosocial behaviour. Three subscales (emotional, hyperactivity, and conduct problems)
240 were used as primary measures of common mental health difficulties in children. Parents rated 25
241 personality attribute items, which are made up of 5 scales of 5 items each, on a 3-point Likert scale from
242 ‘Not true,’ ‘Somewhat true’ to ‘Certainly true’. Subscale totals for emotional symptoms, conduct
243 problems, hyperactivity, peer relationship problems and prosocial behaviour were the sum of the scores
244 for each five items (0-10) and the total difficulties score was obtained by summing the four problem
245 subscale scores (excluding prosocial). The SDQ was completed at Time 1 and Time 2.

246

247 *Vineland Adaptive Behaviour Scales – Second Edition (VABS-II)*

248 The VABS-II (19) was used to measure adaptive behaviour (i.e., age-appropriate behaviours to
249 live and function). A subscale for “maladaptive behaviour” was used for the current study to assess more
250 challenging emotional and external behaviour. The VABS-II has good inter-rater and test–retest
251 reliability, and well-established criterion validity with respect to other well-established measures of
252 adaptive behaviour (71). Parents rated these items using a frequency scale of never (0), sometimes (1),
253 usually (2). The raw scores were used for the analyses. The VABAS-II was completed at Time 1 and
254 Time 2.

255

256 ***Spence Children's Anxiety Scale (SCAS-P)***

257 The SCAS-P (72) was used to measure children's anxiety. The SCAS-P consists of 38 items
258 that a child might worry about (e.g., my child worries about things) divided into 6 subscales: generalised
259 anxiety, panic, separation, physical injury, social phobia & obsessive-compulsive disorder. Parents rated
260 their child on these items on a 4-point Likert scale from 0 (never) to 3 (always) scale. The higher score
261 reflects greater anxiety on each sub-score and the overall total score. The SCAS-P was completed at
262 Time 1 and Time 2.

263

264 ***Covariates***

265 Characteristics of the children with NDDs (age, gender, sub-disorders, type of schooling,
266 Education Health Care Plan (EHCP), Grades) as well as on the characteristics of the parents (age, gender,
267 ethnicity, native language, educational qualification, employment status and type of work) were
268 collected in a general survey completed by the caregivers.

269

270 **Statistical Analysis**

271 Tests of associations were computed to investigate the parental and child reports on several
272 aspects. Followed by group comparisons using One-way ANOVAs for single time-points for cognitive
273 and social factors which was followed by a repeated measures ANOVA was also computed to compare
274 anxiety for each group between pre- and post-school transition. Eta squared (η^2) effect sizes are also
275 reported. Planned post-hoc comparisons were used to compare group differences using Bonferroni
276 corrections. To examine the impact of transition from primary to secondary, we computed a series of
277 linear regression models for each group separately (Autism, DS, WS) for both pre- and post-school
278 transition. It is important to note that we have identified outliers in our sample which we decided to

279 include in our analyses for statistical power and to account for the variability within our NDD sample.
280 All analyses were computed using SPSS v.28 (syntax available here: XXX).

281

282 **Results**

283 **Cognitive and Behavioural Profiles**

284 In total, 10 one-way analyses of variances (ANOVAs) were conducted. First, four one-way
285 analyses of variances (ANOVAs) were conducted to compare (1) children's raw BPVS scores, (2)
286 children's raw RCPM scores, (3) children's SRS scores and (4) Maladaptive Behaviour between the
287 three NDD groups. Next, 6 one-way ANOVAs were conducted to compare scores across the total of
288 SDQ and its 5 sub-scales. [Supplementary Table 1](#) presents all the post-hoc comparisons.

289 The one-way ANOVA to compare BPVS scores revealed a significant difference between the
290 NDD groups, $F(2, 56) = 45.933, p < .001, \eta_p^2 = .62$ (see [Table 3](#)). Post-hoc tests using the Bonferroni
291 adjustment indicated that BPVS scores in the autism group were significantly higher than in the DS (p
292 $< .001$) and WS ($p < .001$) groups. There was no significant difference in BPVS scores between the DS
293 and WS groups ($p = .114$).

294 The one-way ANOVA to compare children's raw RCPM scores between the NDD groups
295 revealed a significant difference between groups, $F(2, 56) = 85.978, p < .001, \eta_p^2 = .75$. Bonferroni post-
296 hoc tests showed that RCPM scores in the autism group were significantly higher than the RCPM scores
297 in the DS ($p < .001$) and WS ($p < .001$) groups. There was no significant difference in RCPM scores
298 between the DS and WS groups ($p = .827$).

299 Next, a one-way ANOVA compared SRS scores between the NDD groups. There was a
300 significant difference between groups, $F(2, 58) = 4.200, p = .02, \eta_p^2 = .13$. A Bonferroni post-hoc test
301 showed that SRS scores in the DS group were significantly lower than scores in the autism ($p = .03$)

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302 group. There were no significant differences in SRS scores between the autism and WS groups ($p = 1$),
303 nor the DS and WS groups ($p = .08$).

304 Then, a one-way ANOVA showed no significant difference between the groups for the
305 Maladaptive Behaviour scores, $F(2, 58) = .721, p = .490, \eta_p^2 = .024$.

306 Finally, six one-way ANOVAs were computed for the SDQ comparing the performance of the
307 three NDD groups. There was a significant difference for the overall SDQ scores: $F(2, 58) = 18.481, p$
308 $< .001, \eta_p^2 = .389$. There was a significant difference between autism and DS ($p < .001$) groups with
309 autistic children scoring higher as well as a difference between children with DS and WS ($p < .001$)
310 with WS children scoring higher. Nonetheless, there was no significant difference between autism and
311 WS groups ($p = .547$).

312 There was a significant difference between the groups for the emotional problems subscale: $F(2,$
313 $58) = 10.027, p < .001, \eta_p^2 = .257$. Again, there was a significant difference between children with DS
314 and autistic children ($p < .001$) and WS ($p = .006$). However, no difference between autism and WS
315 groups ($p = 1.000$). For the hyperactivity problems subscale, whilst the model was significant: $F(2, 58)$
316 $= 4.091, p = .022, \eta_p^2 = .124$, Bonferroni post-hoc analyses showed only one difference between children
317 with DS and WS ($p = .037$), but no other difference between the groups: children with DS vs autistic
318 children ($p = .075$); Autism vs WS ($p = 1.000$). Next, for the peer problems subscale, the model was
319 significant: $F(2, 58) = 18.770, p < .001, \eta_p^2 = .393$ and there was a significant difference between autistic
320 children and children with DS ($p < .001$) as well as WS ($p = .026$). In addition, there was a significant
321 difference between children with WS and DS ($p = .025$). For all comparisons, children with Autism
322 scored higher followed by children with WS and then DS. As for the prosocial problems subscale, the
323 model was significant: $(2, 58) = 4.201, p = .020, \eta_p^2 = .127$, but only autistic children and children with
324 DS differed ($p = .034$) and no difference between autism and WS ($p = .091$) or DS and WS groups ($p =$

325 1.000). Finally, there was no group difference for the conduct problems: $F(2, 58) = 1.252, p = .294, \eta_p^2$
326 $= .041$.

327

328 <<Table 3>>

329

330 **Parental and Child Reports on Outcomes Related to Transition Process**

331 Across all three groups, most children reported that they liked their new school, $\chi^2(4, 55) = 5.28,$
332 $p = .26,$ and that they had made friends, $\chi^2(2,57) = 2.72, p = .26$ (see [Table 4](#)). However, children with
333 WS stated significantly higher incidence of being teased or bullied, compared to those with DS or autistic
334 children; $\chi^2(2,57) = 10.04, p < 6.59e-3$.

335 Parents reported that they had noticed a negative change in their child since the transition for
336 about 19%-32% of the children (see [Table 4](#)). There were no significant group differences, $\chi^2(2,59) =$
337 $1.53, p = .47$. There was also no significant difference between the three groups for school refusal: $\chi^2(2)$
338 $= 1.46, p = .48$. In terms of their child being bullied, parental reports did not vary from what the children
339 reported as there were significant differences between the three groups with the parents of autistic
340 children and of children with WS reporting more problems with bullying: $\chi^2(2,53) = 6.25, p = .04$ at
341 post-school transition.

342 There were group differences for how well the children had settled into their new school as
343 reported by the parents, with children in the autism group scoring significantly lower than those with
344 DS or WS; $F(2,57) = 7.72, p < 1.08$. Bonferroni post-hoc tests showed significant differences between
345 autism and DS groups ($p = .001$), autism and WS groups ($p = .04$), but no significant difference between
346 DS and WS ($p = 1.00$).

347

348

[<<Table 4 >>](#)

349

350 Impact of primary to secondary school transition on anxiety

351 A repeated measures ANOVA was conducted to compare the effect of time (pre- and post-school
352 transition) on children's anxiety scores, between the three NDD groups. There was no significant effect
353 of time, $F(1, 57) = .008, p = .928, \eta_p^2 = .000$, or interaction between time and group, $F(2, 57) = .385, p$
354 $= .682, \eta_p^2 = .013$. However, there was a significant effect of group, $F(2, 57) = 4.126, p = .021, \eta_p^2 =$
355 $.126$. SCASP scores were significantly higher in the WS group compared to the DS group ($p = .023$).
356 There were no differences between the autism and WS group ($p = .802$) nor the autism and the DS group
357 ($p = .163$). [Table 4](#) presents post-hoc comparisons of the three groups (Mean and Standard Deviations).
358 [Figure 1](#) visualises the scores of pre- and post-school transition for all three groups with 11 autistic
359 children (44%) and 9 children with WS (60%) scoring above the clinical cut-off point in both pre- and
360 post-school transition measure. As for the children with DS, 6 scored above the cut-off point in pre-
361 school transition (29%) and only 4 (19%) in the post-school transition measure. [Table 2 in](#)
362 [supplementary](#) materials presents a detailed breakdown.

363

364

[<<Table 5 >>](#)

365

[<<Figure 1 >>](#)

366

367 Predictors of impact of school transition on Anxiety (Regressions per Group)

368 Three multiple linear regressions were computed for each of the three NDD groups to predict
369 Anxiety (Total SCAS-P) from the following variables: cognitive abilities (BPVS and RCPM), social
370 impairment (SRS), adjustment and psychopathology (SQD) and maladaptive behaviour (Vineland

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371 Adaptative Behaviour) for both pre-school transition from primary to secondary school as well as post-
372 transition, resulting in 6 linear models. To maximise the value of the data we have available, we excluded
373 cases using a listwise deletion. The reported models can be found in [Table 6](#) and the coefficients from
374 the models in [Table 7](#).

375

376 **Autism Group**

377 In the multiple linear regression analysis ([Table 6, 7](#)) for the autism group, there was an
378 association between maladaptive behaviour ($b=1.459$, $\beta=.798$), SDQ emotional ($b=3.925$, $\beta=.651$), SDQ
379 conduct ($b=-5.265$, $\beta=-.646$) and SDQ peer problems ($b=-2.424$, $\beta=-.323$) and anxiety in pre-school
380 transition. However, there was not an association with the other factors. Autistic children who scored
381 higher in maladaptive behaviours and emotional problems tended to exhibit higher levels of anxiety.
382 Whereas those who scored higher in conduct and peer problems tended to exhibit lower levels of anxiety
383 during the pre-school transition measurements. For the post-transition analysis, SDQ emotional
384 ($b=4.171$, $\beta=.672$) and SDQ peer problems ($b=-3.689$, $\beta=-0.477$) were associated with higher levels of
385 anxiety. Autistic children who scored higher on emotional problems were more likely to experience
386 higher levels of anxiety and interestingly having more peer problems was not related to increase levels
387 of anxiety in the post-school transition period.

388

389 **Down Syndrome Group**

390 For the Down Syndrome group analysis ([Table 6, 7](#)) in pre-school transition, a different pattern
391 of associations was found where only SDQ emotional problems ($b=5.066$, $\beta=.656$) were associated with
392 anxiety. Children with DS who scored higher in emotional problems tended to exhibit higher levels of
393 anxiety in pre-school transition measurements. With regards to the post-school transition analysis, only

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394 SDQ emotional problems ($b=5.898$, $\beta=.718$) was associated with anxiety. Which appears that children
395 with DS who scored higher in emotional problems were more likely to experience higher levels of
396 anxiety in post-school transition.

397

398 **William Syndrome Group**

399 Finally, for the William Syndrome group analyses ([Table 6, 7](#)) in pre-school transition none of
400 the factors predicted anxiety. However, social skills ($b=.703$, $\beta=-.750$) was significantly associated with
401 higher levels of anxiety in the post-school transition. Hence, children with WS who scored higher on
402 SRS-2, exhibited worse social skills, were more likely to experience high levels of anxiety in post-school
403 transition.

404

405 **Discussion**

406 To the best of our knowledge, this is the first cross-syndrome comparison study that examined
407 the effect of transition from primary to secondary school on the anxiety levels of children with NDDs
408 across different groups, namely autism, DS and WS. Primarily, we examined parental and child reports
409 on outcomes related to the transition process with regards to bullying and settling in the school. Next,
410 we investigated the three groups for cognitive abilities, social ability, adjustment and psychopathology
411 attributes as well as maladaptive behavioural differences. Finally, we examined anxiety levels as well
412 as what factors predict anxiety levels for pre- and post-school transition for the three NDDs groups to
413 understand better what factors contribute to anxiety. This study not only provides evidence to better
414 understand the variability within each group, but it also identifies clusters of overlap which also helps
415 us understand the unique profiles of specific NDD groups when thinking about for to support the
416 transition from primary to secondary schools for those with different NDDs.

417

418 **Child and Parental Reports on Outcomes Related to the Transition Process**

419 From the collected reports on the transition process, we tested our first hypothesis which our
420 data confirmed. Autistic children scored higher on negative transition outcomes as they were less likely
421 to be settled into their new school and reported bullying. Previous literature suggests that this is common
422 for autistic children as they are more likely to be anxious and stressed about several school-related
423 aspects (28,35,63) during the transition. Our data also showed that there were no differences in
424 settlement between children with DS and WS. The lack of difference between the WS and DS group
425 could be rooted in the fact that both groups are very social, despite their fears and struggles and that both
426 groups like to please other people, which might explain why there was also no difference between
427 children with DS and WS for reports around liking their new school, making new friends, or settling in
428 the new school. These findings indicate that each NDD group has to face its own challenges when it
429 comes to settling into the new environment.

430 Autistic children’s report showed that they were more teased or bullied in their secondary
431 provision compared to children with DS. However, children with WS experienced more bullying than
432 autistic children. Parental reports echoed the findings for bullying, in that parents of children with WS
433 and autistic children reported more problems with bullying than parents of children with DS but only in
434 the post-school transition time. In the pre-school transition time, there were no differences. These
435 findings replicate previous research which has shown that parents of autistic children tend to report more
436 worries about problems with bullying (63,64). Taking into account the lack of research on bullying
437 experiences in WS and DS (62), our findings highlight that some groups are at more risk of bullying
438 than others and that further research in this area is required to fully understand the bullying experiences

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439 of these groups and impact these experiences may have. Finally, our study provides evidence that
440 bullying percentages are indeed high in some NDD populations (19–21).

441 Whilst in the typically developing literature it has been found that issues related to bullying and
442 belonging can lead to high school absence (73), there was no difference between groups on school
443 refusal despite the bullying problems experienced by the children. Still, parents reported a noticeable
444 negative change in the children's demeanour since the transition across the three groups.

445

446 **Impact of primary to secondary school transition on anxiety**

447 For our second hypothesis, we expected to see children with autism and WS to exhibit higher
448 levels of anxiety compared to children with DS compared to pre- and post-school transition. As it was
449 predicted, our data revealed that children with WS scored significantly higher compared to DS,
450 However, there were no differences between WS and the autism groups nor the autism and DS groups.

451 Despite the differences amongst the groups, there was no difference between pre and post anxiety
452 scores in any of the groups. This finding replicates the results from Mandy and colleagues for autistic
453 children (32) and extends these for the first time to children with DS and WS. Importantly though,
454 autistic children and those with WS scored high in terms of anxiety for both pre- and post-school
455 transition which could explain the lack of time effect. Looking at our data closely, indeed the number of
456 autistic children and those with WS who scored above the clinical cut-off point remained stable for both
457 pre- and post- transition, yet there was a minor decline in the number of children with Down syndrome,
458 who showed clinical anxiety (see [Supplementary Table 2](#) for a detailed overview).

459 Overall, this analysis revealed that even though autistic children are very anxious and often
460 experience stressful transitions (28,35,63), so are children with WS (59,62) and children with DS.
461 Looking at Supplementary [Figure 1](#), our study also provides some evidence for the within-group

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462 variability despite the lack of the between-group variability in anxiety scores, as such we explored what
463 cognitive and behavioural factors might predict this variability.

464

465 **Cognitive and Behavioural Profiles**

466 As there were large individual differences for anxiety levels within each group for both pre-and
467 post-transition, we explore what factors could predict anxiety levels in each NDD group. For our third
468 hypothesis, we expected to see a difference amongst the three groups in the cognitive and behavioural
469 profiles as suggested by previous research as discussed in the introduction. For the verbal, intelligence,
470 and reasoning tasks autistic children scored higher compared to children with DS and WS (74) in line
471 with the cognitive difficulties that have been previously reported in DS and WS (41,42,61,75) (e.g.,
472 cognitive delays in terms of language abilities).

473 For the social skills, children with DS scored lower than autistic children, but there were no
474 significant differences between DS and WS or autistic children and those with WS. These findings
475 replicate previous (47) in the field. On a social and behavioural note, autistic children scored higher on
476 adjustment and psychopathology compared to children with DS and WS in emotional and peer problems.
477 Previous research highlights the low rates of severe behavioural and emotional problems in children
478 with DS (76). As for the children with WS more attention needs to be drawn towards understanding
479 social and behavioural aspects of these children as the research evidence is inconclusive (58,77). Finally,
480 in line with previous studies, there were no group differences in terms of maladaptive behaviour
481 (42,78,79). The current study was the first to compare maladaptive behaviour scores across same aged
482 groups with different NDDs and it replicated findings from focused studies in specific populations
483 (42,79).

484

485 Predictors of Anxiety for Pre- and Post-School Transition

486 For our final hypothesis, we expected to see psychopathology and maladaptive behaviour as two
487 significant factors for pre- and post-school transition anxiety across the three groups. For the autism
488 group, higher levels of maladaptive behaviour and some aspects of the psychopathology scale
489 (specifically, emotional, conduct and peer problems) were strongly associated with higher levels of
490 anxiety pre-school transition. Nevertheless, in the post-school transition time only two items from the
491 psychopathology scale (e.g., emotional and peer problems) were associated with high anxiety levels.
492 One interpretation of this is that anxiety levels for post-school transition ($M= 29.3$) fall compared to the
493 pre-school transition point ($M=30.3$) but not to a significant level. Yet, such conclusions should be
494 considered tentative as further investigation is needed. For both pre- and post-school transition times,
495 peer problems were negatively associated with higher levels of anxiety meaning that those with more
496 peer problems have more anxiety. Whilst previous research assumes that individuals with anxiety
497 usually have limited social skills and social interactions (80,81), other evidence suggests that this is a
498 universal experience and not all individuals with an anxiety disorder will experience peer problems
499 too(80,81).

500 For the children with DS, maladaptive behaviour was not associated with higher levels of
501 anxiety. Instead, only emotional problems were associated with higher levels of anxiety both pre- and
502 post-school transition. Overall, children with DS tend to internalise their emotions more (82); hence it
503 is reasonable to see emotional problems act as a predictive factor of anxiety. Additionally, previous
504 research documents the high rates of emotional and behavioural problems in individuals with DS (83).

505 While emotional problems were associated with higher anxiety levels for both the DS and autism
506 group, it is still possible that this causal link is triggered by different factors considering how different

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507 the mental health, cognitive and behavioural profiles of these two groups are. However, these is still
508 great uncertainty about these aspects and future research needs to provide more solid evidence on that.

509 When adjusting for the same factors in children with WS for pre- and post-school transition
510 anxiety, only social impairment was associated with higher levels of anxiety at post-school transition.
511 This outcome is not striking. Teachers often report that children with WS show social reciprocity
512 difficulties around social cognition, communication and engagement which could also be due to the new
513 school environment (57). In addition, due to their social profile, children with WS find it more
514 challenging to socialise and form relationships, especially as they get older, regardless of their strong
515 drive for socialisation (84). Subsequently, their low social skills are also the reason for having increased
516 risk for social isolation, bullying and unsteady relationships (85).

517 The lack of other significant predictors for anxiety could be explained by the lack of statistical
518 power or the aetiology of anxiety in this group. Anxiety in children with WS often is triggered by phobias
519 and uncertainty (86) compared to children with autism which is often due to difficult social situations
520 and sensory environments (87). Finally, it is also important to consider that the WS group scored the
521 highest on anxiety levels for both pre- and post-school transition which also means that there was little
522 variance in our sample; the fact that there is less variability could possibly explain that no other factors
523 were associated with anxiety in this group.

524

525 **Limitations and Future Studies**

526 One important limitation of the study is the small sample size of our groups. However, this is a
527 common and recurring issue in the field of NDDs. Having said that though, it is important to stress that
528 the children recruited in the study are from a narrow age range which allows better insight into the
529 variability within a particular age group but limits the size of the group. In addition, for children with

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530 WS we have recruited about half the population for that age in the UK according to the number of people
531 for that age range registered with Williams Syndrome Foundation.

532 Another limitation is also the accurate representation of the parents; there is a possibility that our
533 study attracted only those parents who are not satisfied with the school transitions procedures or the
534 performance of their child in the school. Next, parents completed the SDQ and the SCAS-P and thus
535 there might be a bias as to how they perceived their children's mental health and behaviour. However,
536 research has shown that parents are usually very good at estimating their child's abilities (88). Finally,
537 in this study we assessed children with NDDs within the first term in their secondary school; and
538 problems often are not evident or settled until nearly the summer term. Hence, the lack of difference
539 across several factors might be due to the short interval between the pre- and post-school transition
540 measures.

541 Therefore, future research should focus on longitudinal data to understand the mental health of
542 children with NDDs as there are many different factors that can impact their psychosocial wellbeing
543 through their life course. At the time of the first assessment children were already aware of a transition
544 would happen and thus anxiety might already have been higher, assessing anxiety at different time points
545 across the life span would allow a further understanding how unique the anxiety patterns during school
546 transition are compared to other times of transition.

547

548 **Impact and Conclusion**

549 Taking all these analyses together, the present cross-syndrome study provides deeper insight in
550 the transition from primary to secondary school for children with NDDs. To begin with, it showed that
551 all NDDs reported several difficulties related to the transition but that reasons for experiencing a difficult
552 transition differed between the groups with autistic children failing to settle in and those with WS

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553 reporting higher incidences of bullying. Secondly, although there was no change in anxiety levels over
554 time, a significant number of individuals across all NDD groups showed clinical anxiety both pre- and
555 post-school transition. In addition, those with autism and Williams syndrome showed the highest levels
556 of anxiety at both time points. Nevertheless, children with WS were more anxious than children with
557 autism. Next, there were some key differences in the predictive factors for anxiety amongst all three
558 NDD groups. For autistic children and those with DS emotional problems seem to be a key predicting
559 factor of high anxiety for pre-school transition period with great feelings of unhappiness. It also appears
560 that children with WS with higher levels of social impairment in post-school transition show higher
561 anxiety.

562 The current findings therefore suggest that school transition is a time of high anxiety for many
563 children with different NDDs and thus these children benefit from additional support, especially mental
564 wellbeing support during their school transition. For example, support could focus on managing bullying
565 from all aspects and helping students settle in. In addition, the findings show that across the different
566 NDDs there are individual differences as well as different factors that might be driving anxiety levels
567 during a period of transition. As such, interventions will need to be tailored to the individual child but
568 providing social and emotional support seem to be key factors of support to be provided. Although
569 further research is needed to understand the factors that could contribute to children with WS' anxiety
570 and those with DS during times of transition, the findings from the current study can also inform future
571 behaviours in similar situations, e.g., moving houses, new schools.

572

573

574 **List of abbreviations**

575 NDDs; Neurodevelopmental Disorders, DS; Down Syndrome, WS; Williams Syndrome, BPVS; British
576 Picture Vocabulary Scale, RCPM; Raves Colours Progressive Matrices, SDQ; Strengths and
577 Difficulties, VABS – II; Vineland Adaptive Behaviour Scales, SCASP; Spence Children’s Anxiety
578 Scale-Parent, EHCP; Education, Health, and Care Plan

579

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583

584 **Authors Contributions**

585 OP and JVH conceived the study and designed the methodology of the project. EB and MA recruited
586 and collected the data. OP, JVH and VS have planned the analysis. VS carried out the analysis. VS wrote
587 the first draft of the manuscript with input from OP and JVH. All authors contributed equally to the final
588 manuscript.

589

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592

593 **Declarations**

594

595 **Ethics approval and consent to participate**

596

597 Ethical approval for the study was obtained from the Ethics Committee of XXX prior to the data
598 collection (Ethics REF: YYY). Respondents provided online consent to participate in the study.

599

600 **Consent for publication**

601 Not applicable.

602

603 **Competing interests**

604 All authors declare that they have no competing interests.

605

606 **Availability of data and material**

607 The data and material that support the findings of this study are available upon request.

608

609

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927 **Table 1.** Characteristics of children with neurodevelopmental disorders included in the study

Characteristic	Neurodevelopmental Disorder			
	Autism (<i>n</i> = 25)	Down Syndrome (<i>n</i> = 21)	Williams Syndrome (<i>n</i> = 15)	Total (<i>n</i> = 61)
Age in months, <i>M</i> (<i>SD</i>)	135.9 (<i>SD</i> = 3.8)	139.1 (<i>SD</i> = 5.1)	134.1 (<i>SD</i> = 4.6)	
Gender				
Female	7 (11.47%)	8 (13.11%)	8 (13.11%)	23 (37.70%)
Male	18 (29.5%)	13 (21.3%)	7 (11.47%)	38 (62.29%)
School type ^a				
Mainstream	22 (36.06%)	15 (24.59%)	6 (9.83%)	43 (70.49%)
Special needs	2 (3.27%)	4 (6.55%)	8 (13.11%)	14 (22.95%)
Mixed	1 (1.63%)	2 (3.27%)	1 (1.63%)	4 (6.55%)
Other	-	-	-	-
School type ^b				
Mainstream	17 (27.86%)	9 (14.75%)	1 (1.63%)	27 (44.26%)
Special needs	3 (4.91%)	12 (19.67%)	13 (21.31%)	28 (45.90%)
Mixed	3 (4.91%)	-	1 (1.63%)	4 (6.55%)
Other	2 (3.27%)	-	-	2 (3.27%)
EHCP ^c Pre-school transition				
Yes	9 (15.79%)	21 (36.84%)	14 (24.56%)	44 (77.19%)
No	13 (22.80%)	-	-	13 (22.81%)
Missing response*	3	-	1	4
EHCP ^c Post-school transition				
Yes	14 (22.95%)	21 (34.42%)	15 (24.59%)	46 (81.96%)
No	11 (18.04%)	-	-	11 (18.04%)
Missing response	-	-	-	-
Co-morbidity				
Yes	17 (27.86%)	5 (8.19%)	4 (6.55%)	26 (42.62%)
No	8 (13.11%)	16 (26.23%)	11 (18.03%)	35 (57.37%)

^a Pre-school transition. ^b Post-school transition. ^c Education Health and Care Plan (EHCP). * We used complete percentages that's why we do not report percentages in the missing responses.

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Table 2. Characteristics of parents of children with neurodevelopmental disorders included in the study

Characteristic	Neurodevelopmental disorder			
	Autism (<i>n</i> = 25)	Down Syndrome (<i>n</i> = 21)	Williams Syndrome (<i>n</i> = 15)	Total (<i>n</i> = 61)
Age group				
31 – 40 years	5 (8.20%)	1 (1.64%)	7 (11.48%)	13 (21.31%)
41 – 50 years	14 (22.95%)	17 (27.84%)	6 (9.84%)	37 (60.66%)
51 – 59 years	6 (9.84%)	3 (4.92%)	2 (3.28%)	11 (18.03%)
Ethnicity or race				
Asian	-	1 (1.64%)	1 (1.64%)	2 (3.28%)
Black or African American	-	1 (1.64%)	1 (1.64%)	2 (3.28%)
White or European American	22 (36.07%)	19 (31.15%)	13 (21.31%)	54 (88.52%)
Mixed	2 (3.28%)	-	-	2 (3.28%)

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Other ^a	1 (1.64%)	-	-	1 (1.64%)
Gender				
Female	23 (37.70%)	21 (34.43%)	12 (19.67)	56 (91.80%)
Male	2 (3.28%)	-	3 (4.92%)	5 (8.20%)
Highest level of Education ^b				
No formal education	-	-	1 (1.67%)	1 (1.67%)
GCSE or equivalent	2 (3.33%)	2 (3.33%)	3 (3.33%)	7 (11.67%)
A-level	3 (5%)	4 (6.67%)	2 (3.33%)	9 (15%)
Vocational	1 (1.67%)	1 (1.67%)	-	2 (3.33%)
Graduate	8 (13.33%)	7 (11.67%)	6 (10%)	21 (35%)
Post-graduate	10 (16.67%)	7 (11.67%)	3 (5%)	20 (33.33%)
Current employment status ^b				
Full time employed	7 (11.48%)	2 (3.28%)	6 (9.84%)	15 (24.59%)
Part time employed	11 (18.03%)	12 (19.67%)	5 (8.20%)	28 (45.90%)
Volunteer	-	1 (1.64%)	1 (1.64%)	2 (3.28%)
Prime Homemaker	7 (11.48%)	6 (9.84%)	2 (3.28%)	15 (24.59%)
Unemployed	-	-	-	-
Student	-	-	1 (1.64%)	1 (1.64%)

^aThe “other” classification was composed of participants who self-identified as Latina, Filipina, or multiracial. ^bPre-school transition.

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Table 3. Raw Scores of Measures for autistic children, children with Down Syndrome and Williams Syndrome.

Measure	Neurodevelopmental Disorder		
	Autism	Down Syndrome	Williams Syndrome
BPVS	136 (25.26)	73.90 (23.07)	90.07 (14.62)
RCPM	31.83 (5.66)	13.20 (5.03)	15.13 (4.32)
SRS	88.68 (25.68)	69.52 (24.85)	88.20 (20.84)
Maladaptive Behaviour	24.96 (9.10)	21.90 (10.48)	24.87 (7.87)
SDQ Total	21.40 (6.01)	12.33 (4.50)	19.13 (4.32)
SDQ Emotion problems	5.20 (2.75)	2.05 (2.11)	4.80 (2.57)
SDQ Hyperactivity problems	7.08 (2.68)	5.48 (2.18)	7.53 (1.96)
SDQ Peer problems	6.20 (2.25)	2.67 (1.68)	4.47 (1.73)
SDQ Prosocial problems	5.92 (2.12)	7.4 (1.83)	7.3 (1.80)
SDQ Conduct Problems	2.92 (2.08)	2.14 (1.42)	2.33 (1.45)

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Table 4. Reported concerns about transitions for children with neurodevelopmental disorders

Transition Concerns	Neurodevelopmental disorder		
	Autism (n = 25)	Down syndrome (n = 21)	Williams Syndrome (n = 15)

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		N (%)	N(%)	N(%)
Reported by Children				
I like my new school	Yes	19 (34.55%)	18 (32.73%)	11 (20.00%)
	No	4 (7.27%)	-	2 (3.64%)
	Don't Know	-	1 (1.82%)	-
Did you make new friends?	Yes	20 (35.09%)	19 (33.33%)	14 (24.56)
	No	3 (5.26%)	-	1 (1.75)
I get teased/bullied at school	Yes	11 (19.30%)	2 (2.51%%)	9 (15.79%%)
	No	12 (21.05%)	17 (29.82%)	6 (10.53%)
Reported by Parents				
Have you noticed a change in your child since they moved to secondary school?	Yes, Positive change	8 (13.56%)	4 (6.78%)	5 (8.47%)
	Yes, Negative change	15 (25.42%)	17 (28.81%)	10 (16.95%)
	No Change	-	-	-
Has your child ever refused to go to their new school or tried to get out of going?	Yes	9 (14.75%)	5 (8.20%)	3 (4.92%)
	No	16 (26.23%)	16 (26.23%)	12 (19.67%)
Has your child had any problems with bullying (e.g., called nasty names, teased, physically hurt) at their new school?	Yes	11 (20.8%)	3 (5.7%)	7 (13.2%)
	No	9 (17%)	15 (28.30%)	8 (15.01%)
Adjustment to New School				
How well has your child settled into their new school?		M= 6.32 (SD = 2.51)	M= 8.52 (SD = 1.03)	M= 8.00 (SD = 1.96)
	On a scale from 0 (not well) to 10 (very well)			

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949 **Table 5.** Anxiety pre- and post-school transition per neurodevelopmental disorder

Measure	Pre-school transition			Post-school Transition		
	Autism	Down Syndrome	Williams Syndrome	Autism	Down Syndrome	Williams Syndrome
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Spence Children's Anxiety Scale	30.3 (16.7)	20.8 (16.2)	35.1 (16.1)	29.3 (19.8)	19.8 (17.5)	36.8 (19.8)

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Table 6. Multiple Linear Regression Models Summary

Models	
1 - Autism ^a	$F(9,23) = 11.038, p < .001, R^2 = .876$ and R^2 adjusted = .797
2 - Autism ^b	$F(9,23) = 3.928, p < .001, R^2 = .846$ and R^2 adjusted = .716
3 - Down Syndrome ^a	$F(9,23) = 9.465, p < .001, R^2 = .895$ and R^2 adjusted = .800
4 - Down Syndrome ^b	$F(9,19) = 3.656, p < .002, R^2 = .876$ and R^2 adjusted = .557
5 - Williams Syndrome ^a	$F(9,13) = 2.138, p = .241, R^2 = .828$ and R^2 adjusted = .441
6 - Williams Syndrome ^b	$F(9,14) = 4.074, p = .068, R^2 = .880$ and R^2 adjusted = .664

a. Dependent Variable: Anxiety Pre-School Transition,

b. Dependent Variable: Anxiety Post-School Transition

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Table 7. Coefficients of all the multiple linear regression models

Model	Unstandardized	Standard Error	Standardized	t	p	VS-MPR*	95% CI	
							Lower	Upper
1 - Autism ^a BPVS	0.140	0.142	0.209	0.986	0.341	1.003	-0.164	0.444
RCPM	-0.908	0.628	-0.304	1.445	0.170	1.220	-2.255	0.439
SRS	-0.081	0.110	-0.125	0.737	0.473	1.000	-0.316	0.154
Maladaptive Behaviour	1.459	0.402	0.798	3.625	0.003*	22.649	0.596	2.322
SDQ Emotion Problems	3.925	0.759	0.651	5.174	< .001*	294.137	2.298	5.552
SDQ Conduct Problems	-5.265	1.131	-0.646	4.656	< .001*	125.593	-7.690	-2.840

Table 7. Coefficients of all the multiple linear regression models

Model	Unstandardized	Standard Error	Standardized	t	p	VS-MPR*	95% CI		
							Lower	Upper	
	SDQ Hyperactivity Problems	-0.331	0.823	-0.053	0.402	0.694	1.000	-2.097	1.435
	SDQ Peer Problems	-2.424	0.924	-0.323	2.623	0.020*	4.688	-4.406	-0.441
	SDQ Prosocial Problems	-0.137	0.926	-0.017	0.147	0.885	1.000	-2.122	1.849
2 - Autism ^b	BPVS	6.119e-4	0.221	8.866e-4	0.003	0.998	1.000	-0.474	0.475
	RCPM	-0.510	0.980	-0.166	0.520	0.611	1.000	-2.612	1.592
	SRS	0.159	0.171	0.238	0.927	0.370	1.000	-0.208	0.525
	Maladaptive Behaviour	0.614	0.628	0.326	0.978	0.345	1.002	-0.733	1.961
	SDQ Emotion Problems	4.171	1.184	0.672	3.524	0.003*	19.183	1.633	6.710
	SDQ Conduct Problems	-2.498	1.764	-0.298	1.416	0.179	1.196	-6.282	1.286
	SDQ Hyperactivity Problems	-0.828	1.285	-0.128	0.644	0.530	1.000	-3.583	1.928
	SDQ Peer Problems	-3.689	1.442	-0.477	2.558	0.023*	4.273	-6.781	-0.596
	SDQ Prosocial Problems	0.307	1.445	0.037	0.213	0.835	1.000	-2.791	3.406
3 - DS ^a	BPVS	0.119	0.112	0.168	1.063	0.313	1.012	-0.130	0.368
	RCPM	0.216	0.486	0.067	0.445	0.666	1.000	-0.867	1.299
	SRS	-0.240	0.162	-0.371	1.480	0.170	1.222	-0.602	0.121
	Maladaptive Behaviour	0.389	0.409	0.254	0.950	0.364	1.000	-0.523	1.300
	SDQ Emotion Problems	5.066	1.690	0.656	2.997	0.013*	6.360	1.299	8.833
	SDQ Conduct Problems	1.329	1.837	0.118	0.724	0.486	1.000	-2.764	5.422
	SDQ Hyperactivity Problems	0.816	1.040	0.104	0.784	0.451	1.000	-1.501	3.133
	SDQ Peer Problems	0.365	1.052	0.038	0.347	0.736	1.000	-1.979	2.709
	SDQ Prosocial Problems	2.281	1.551	0.258	1.470	0.172	1.214	-1.176	5.738
4 - DS ^b	BPVS	-0.098	0.177	-0.130	0.551	0.594	1.000	-0.492	0.297
	RCPM	1.043	0.770	0.303	1.354	0.205	1.131	-0.673	2.759
	SRS	-0.454	0.257	-0.659	1.764	0.108	1.530	-1.027	0.119

Table 7. Coefficients of all the multiple linear regression models

Model	Unstandardized	Standard Error	Standardized	t	p	VS-MPR*	95% CI		
							Lower	Upper	
Maladaptive Behaviour	1.181	0.648	0.727	1.823	0.098	1.613	-0.263	2.625	
SDQ Emotion Problems	5.898	2.678	0.718	2.202	0.052*	2.385	-0.070	11.866	
SDQ Conduct Problems	-4.727	2.911	-0.395	1.624	0.135	1.359	-11.212	1.758	
SDQ Hyperactivity Problems	1.315	1.648	0.158	0.798	0.443	1.000	-2.356	4.986	
SDQ Peer Problems	2.482	1.667	0.243	1.489	0.167	1.230	-1.232	6.195	
SDQ Prosocial Problems	0.150	2.458	0.016	0.061	0.953	1.000	-5.327	5.627	
5 – WS ^a									
BPVS	-0.294	0.411	-0.264	0.714	0.515	1.000	-1.436	0.849	
RCPM	-0.012	1.145	-0.003	0.011	0.992	1.000	-3.190	3.165	
SRS	0.685	0.433	0.846	1.583	0.188	1.170	-0.516	1.886	
Maladaptive Behaviour	-1.488	0.996	-0.754	1.493	0.210	1.123	-4.254	1.278	
SDQ Emotion Problems	3.128	4.600	0.495	0.680	0.534	1.000	-9.644	15.901	
SDQ Conduct Problems	0.860	4.689	0.080	0.184	0.863	1.000	-12.157	13.878	
SDQ Hyperactivity Problems	1.422	2.247	0.179	0.633	0.561	1.000	-4.816	7.660	
SDQ Peer Problems	0.864	2.305	0.093	0.375	0.727	1.000	-5.536	7.264	
SDQ Prosocial Problems	-0.061	4.608	-0.006	0.013	0.990	1.000	-12.855	12.734	
6 – WS ^b									
BPVS	0.228	0.292	0.171	0.779	0.471	1.000	-0.524	0.980	
RCPM	-1.077	0.998	-0.238	1.079	0.330	1.006	-3.643	1.490	
SRS	0.703	0.242	0.750	2.906	0.034*	3.229	0.081	1.325	
Maladaptive Behaviour	-1.783	0.878	-0.719	2.032	0.098	1.617	-4.040	0.473	
SDQ Emotion Problems	5.786	2.497	0.761	2.318	0.068	2.008	-0.631	12.204	
SDQ Conduct Problems	-0.400	3.157	-0.030	0.127	0.904	1.000	-8.515	7.716	
SDQ Hyperactivity Problems	1.754	1.906	0.176	0.920	0.400	1.000	-3.146	6.654	
SDQ Peer Problems	-1.504	2.119	-0.133	0.710	0.510	1.000	-6.951	3.943	

Table 7. Coefficients of all the multiple linear regression models

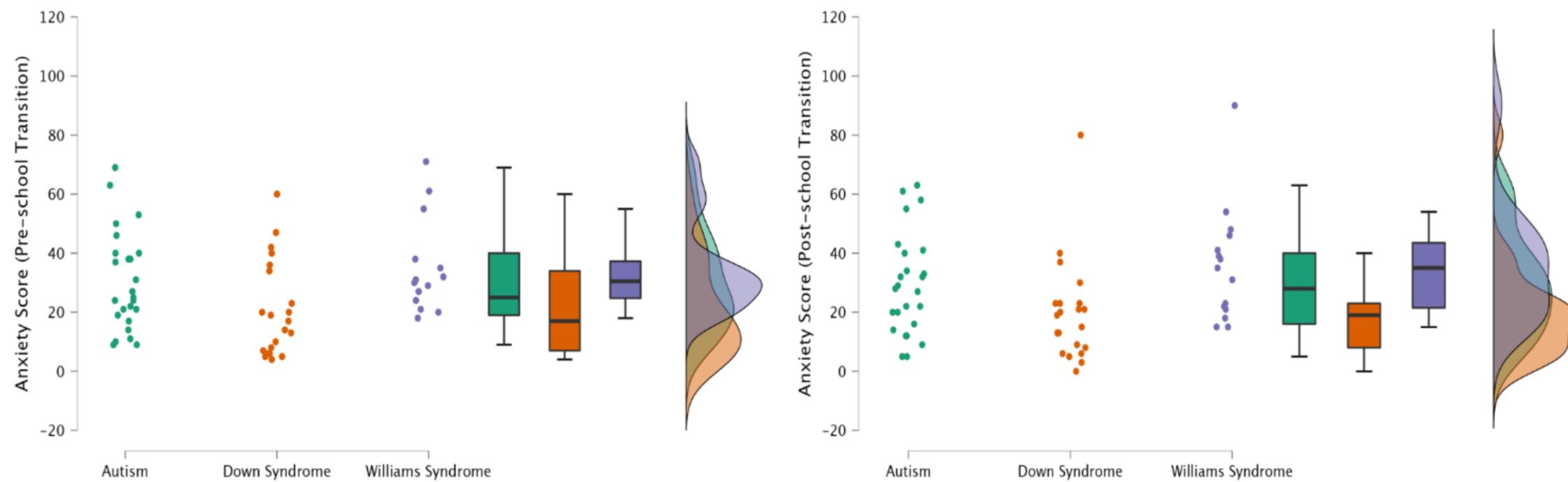
Model	Unstandardized	Standard Error	Standardized	t	p	VS-MPR*	95% CI	
							Lower	Upper
SDQ Prosocial Problems	1.644	2.566	0.151	0.641	0.550	1.000	-4.953	8.240

* *Vovk-Sellke Maximum p -Ratio: Based on the p -value, the maximum possible odds in favor of H₁ over H₀ equals 1/(-e p log(p)) for p ≤ .37 (Sellke, Bayarri, & Berger, 2001).*

a. Anxiety Pre-School Transition,

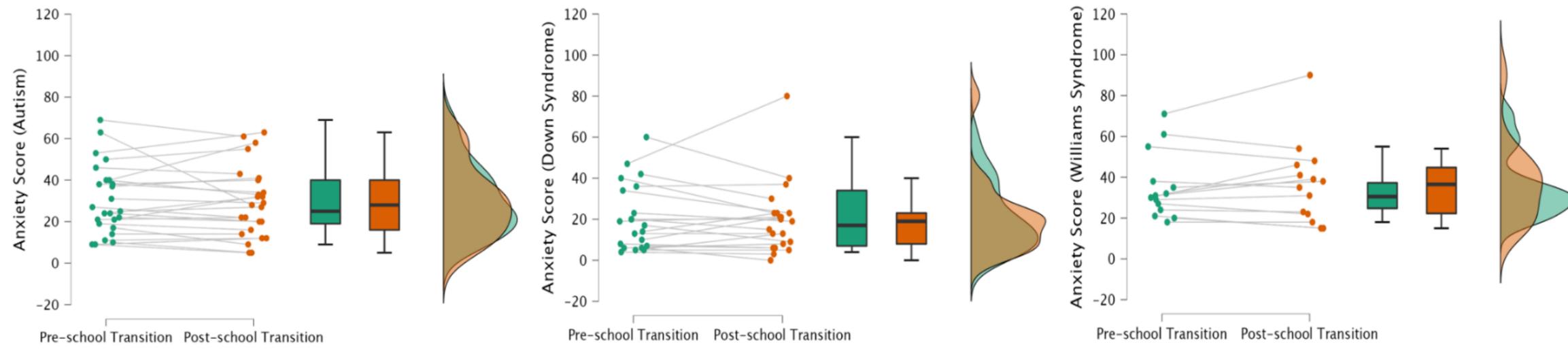
b. Anxiety Post-School Transition

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Figure 1. Overview of anxiety between NDD groups over pre- and post-school transition



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957 **Supplementary Figure 1.** Overview of anxiety over time for the three NDD groups.
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974 **Supplementary Table 1.** Post-hoc analyses of the 10 One Way ANOVAs
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BPVS - Post Hoc Comparisons - Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	62.10	45.86	78.34	6.74	9.21	2.49e-12 ***
	WS	45.93	28.28	63.58	7.33	6.27	1.68e-7 ***
DS	WS	-16.17	-34.48	2.15	7.61	-2.12	0.11

* p < .05, *** p < .001

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

RCPM - Post Hoc Comparisons - Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	18.63	14.89	22.38	1.56	11.97	1.37e-16 ***
	WS	16.70	12.63	20.77	1.69	9.87	2.21e-13 ***
DS	WS	-1.93	-6.16	2.29	1.76	-1.10	0.83

*** p < .001

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

SRS - Post Hoc Comparisons - Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	19.16	1.85	36.46	7.19	2.66	0.03 *
	WS	0.48	-18.61	19.57	7.94	0.06	1.00
DS	WS	-18.68	-38.44	1.08	8.22	-2.27	0.08

* p < .05

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

Maladaptive Behaviour Post Hoc Comparisons - Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	3.06	-3.59	9.70	2.76	1.11	0.82
	WS	0.09	-7.24	7.43	3.05	0.03	1.00
DS	WS	-2.96	-10.55	4.63	3.16	-0.94	1.00

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

SDQ Total - Post Hoc Comparisons - Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	9.07	5.40	12.73	1.52	5.96	4.85e-7 ***
	WS	2.27	-1.77	6.31	1.68	1.35	0.55
DS	WS	-6.80	-10.98	-2.62	1.74	-3.91	7.31e-4 ***

** p < .01, *** p < .001

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

SDQ Emotion – Post Hoc Comparisons – Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	3.15	1.37	4.93	0.74	4.25	2.32e-4 ***
	WS	0.40	-1.57	2.37	0.82	0.49	1.00
DS	WS	-2.75	-4.79	-0.72	0.85	-3.25	5.72e-3 **

** p < .01, *** p < .001

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

SDQ Conduct - Post Hoc Comparisons - Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	0.78	-0.46	2.01	0.51	1.52	0.40
	WS	0.59	-0.77	1.95	0.57	1.04	0.91
DS	WS	-0.19	-1.60	1.22	0.59	-0.33	1.00

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

SDQ Hyper - Post Hoc Comparisons - Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	1.60	-0.07	3.28	0.70	2.30	0.07
	WS	-0.45	-2.30	1.39	0.77	-0.59	1.00
DS	WS	-2.06	-3.97	-0.14	0.80	-2.59	0.04 *

* p < .05

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

SDQ Peer - Post Hoc Comparisons - Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	3.53	2.15	4.92	0.58	6.12	2.56e-7 ***
	WS	1.73	0.20	3.26	0.64	2.72	0.03 *
DS	WS	-1.80	-3.39	-0.21	0.66	-2.73	0.03 *

* p < .05, *** p < .001

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

SDQ Prosocial - Post Hoc Comparisons - Group

		Mean Difference	95% CI for Mean Difference		SE	t	P _{bonf}
			Lower	Upper			
Autism	DS	-1.51	-2.90	-0.12	0.58	-2.61	0.03 *
	WS	-1.41	-2.94	0.12	0.64	-2.22	0.09
DS	WS	0.10	-1.49	1.68	0.66	0.14	1.00

* p < .05

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the tukey method).

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S.Table 2. *Clinical cut off of children with NDDs in terms of Anxiety.*

Clinical Cut off for Anxiety	Neurodevelopmental disorder			
	Autism (<i>n</i> = 25)	Down syndrome (<i>n</i> = 21)	Williams Syndrome (<i>n</i> = 14)	
	N (%)	N (%)	N (%)	N (%)
Pre-school Transition				
Below	14 (56%)	15 (71.43%)	6 (42.86%)	
Above	11 (44%)	6 (28.57%)	*8 (57.14%)	
Post-school Transition				
Below	14 (56%)	17 (80.95%)	6 (40%)	
Above	11 (44%)	4 (19.05%)	9 (60%)	

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* There is 1 missing data-point in the pre-school transition for children with WS. Valid percentages were used in the table for all reported numbers.

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